**Model-Based Assessment of Efficacy of Discrimination Parameters to Adequately Distinguish VT from SVT in Different Arrhythmia Scenarios**

*Abstract:*  
**Introduction:**  
In patients receiving implantable cardioverter-defibrillators various discrimination algorithms (DA) are utilized in to distinguish supraventricular from ventricular tachycardias (SVT and VT, respectively). The arrhythmia cutoff rate (CO), therapy monitoring delay (DL) or number of consecutive beats in detection zone (NB) affect the accuracy of DA. However, there is paucity of clinical data assessing the impact of modifying these variables on efficacy of various DA. We aimed to study misclassification rates for different arrhythmias and cohort characteristics at various CO and DL/NB values using a large simulated cohort.

**Methods:**  
Using a heart computer model we performed a model-based trial by prospectively testing a large sample of simulated arrhythmia episodes [atrial fibrillation, atrial flutter (AFL), other SVT, sustained and non-sustained VT, VF]. Each episode was run through our implementations of two separate DA: Rhythm ID (RHID; Boston Scientific) and PR Logic + Wavelet (PRLW; Medtronic). The VT zone was given a cut-off rate of 150bpm in both DA. Each arrhythmia was tested with three different CO settings (170, 184, 200 bpm) and variable RHID DL (1-12sec) and PRLW NB settings (8-34 consecutive beats).

**Results:**  
A total of 11,400 episodes were run through both DA. Specificity of both DA increased with the DL/NB value and stops increasing at DL=10 (RHID) and NB=30 (PRLW) for all CO values. RHID’s specificity was highest (.97) for CO=200, DL=10 and lowest (.89) for CO = 200, DL = 1 (all with 95% CI width .004). PRLW’s specificity was highest (1) for CO=200, DL=10 and lowest (.929) for CO = 170, NB=8 (95% CI width=.004). At all settings for both DA, AFL resulted in the highest misclassification rates (RHID: 13%-54.2% across settings, PRLW: 0%-45.2% across settings).

**Conclusion:**  
This model-based analysis suggests that higher cut-off rate and delayed therapy following arrhythmia detection enhance accuracy of two different DA. Amongst various arrhythmia scenarios, atrial flutter had the highest misclassification rate.